

## PATENT COOPERATION TREATY

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## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference LU6154	<b>FOR FURTHER ACTION</b>		See Form PCT/PEA/416
International application No. PCT/EP2004/014582	International filing date (day/month/year) 22.12.2004	Priority date (day/month/year) 23.12.2003	
International Patent Classification (IPC) or national classification and IPC INV. C08F110/00 C08F4/64			
Applicant BASELL POLYOLEFINE GMBH			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau a total of 2 sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input checked="" type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand  30.11.2005		Date of completion of this report  22.05.2006	
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized officer  Parry, J  Telephone No. +31 70 340-1032	



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International application No.  
PCT/EP2004/014582

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**Box No. I Basis of the report**

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1. With regard to the **language**, this report is based on

- ☒ the international application in the language in which it was filed
- ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
  - ☐ international search (under Rules 12.3(a) and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4(a))
  - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements\*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

**Description, Pages**

1-39 as originally filed

**Claims, Numbers**

1-9 received on 30.11.2005 with letter of 29.11.2005

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

\* *If item 4 applies, some or all of these sheets may be marked "superseded."*

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**Box No. II Priority**

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1. ☐ This report has been established as if no priority had been claimed due to the failure to furnish within the prescribed time limit the requested:
- ☐ copy of the earlier application whose priority has been claimed (Rule 66.7(a)).
  - ☐ translation of the earlier application whose priority has been claimed (Rule 66.7(b)).
2. ☒ This report has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rule 64.1). Thus for the purposes of this report, the international filing date indicated above is considered to be the relevant date.
3. Additional observations, if necessary:
- see separate sheet**

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

Novelty (N)	Yes: Claims	1-3
	No: Claims	4-9
Inventive step (IS)	Yes: Claims	
	No: Claims	1-9
Industrial applicability (IA)	Yes: Claims	1-9
	No: Claims	

2. Citations and explanations (Rule 70.7):

**see separate sheet**

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**Box No. VIII Certain observations on the international application**

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The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

**Re Item V**

**Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

The following documents (D1-D2) will be referred to (see the ISR for the relevant passages):

D1: WO 02/098930 A (EQUISTAR CHEMICALS, LP) 12 December 2002 (2002-12-12)

D2: CHAROENCHAIDET S ET AL: "IMPROVING THE PERFORMANCE OF HETEROGENEOUS BORANE COCATALYSTS BY PRETREATMENT OF THE SILICA SUPPORT WITH ALKYLALUMINUM COMPOUNDS" MACROMOLECULAR: RAPID COMMUNICATIONS, WILEY VCH, WEINHEIM, DE, vol. 23, no. 7, 6 May 2002 (2002-05-06), pages 426-431, XP001133227 ISSN: 1022-1336

1. D1 describes the following sequence of preparation: Et<sub>3</sub>Al + pentafluorophenylboronic acid + metallocene + silica support + iBu<sub>3</sub>Al (the latter added in the reactor). This composition is employed as olefin polymerisation catalyst. Hence claims 4-9 are not novel (see Box VIII).

2. D1 describes the following sequence of preparation: Et<sub>3</sub>Al + pentafluorophenylboronic acid + metallocene + silica support + iBu<sub>3</sub>Al (the latter added in the reactor). This composition is employed as olefin polymerisation catalyst. The present set of claims differs from D1 in that the support is first reacted with Et<sub>3</sub>Al (feature 1) before further reaction with compound C. The technical effect associated with feature 1 according to the filed comparative examples is to lead to higher activity and reduced lump formation. However, the comparison with present example 3 is invalid because only an aliquot of the catalyst in the present comparison prepared in the order according to D1 in amounts according to present example 3 was used with the support and not all of it (which would then have yielded a valid comparison for this stage of the process of preparation). Thus the loadings on the silica support of the present comparison are not identical to those of example 3. The objective problem to be solved is therefore only to provide alternative processes for the production of olefin catalysts. It is trivial to vary the addition order, as further exemplified

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(SEPARATE SHEET)**

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by D2. Hence claims 1-3 are not inventive.

**Re Item VIII**

**Certain observations on the international application**

The following objections are made under Art. 6 (PCT):

1. Claims 4-9: These either are product claims or contain nested product claims which are defined by a process of preparation. It cannot be necessarily ascertained that these catalysts were in fact prepared beforehand in this way.

We claim:

1. A process for preparing a supported cocatalyst for olefin polymerization, which comprises first reacting

- A) a support bearing functional groups, with
- B) triethylaluminum and subsequently allowing the reaction product to react with
- C) a compound of the formula (I),



where

A is an atom of group 13 of the Periodic Table,

$R^1$  are identical or different and are each, independently of one another, hydrogen, halogen,  $C_1$ - $C_{20}$ -alkyl,  $C_1$ - $C_{20}$ -haloalkyl,  $C_1$ - $C_{10}$ -alkoxy,  $C_6$ - $C_{20}$ -aryl,  $C_6$ - $C_{20}$ -haloaryl,  $C_6$ - $C_{20}$ -aryloxy,  $C_7$ - $C_{40}$ -arylalkyl,  $C_7$ - $C_{40}$ -haloarylalkyl,  $C_7$ - $C_{40}$ -alkylaryl,  $C_7$ - $C_{40}$ -haloalkylaryl or an  $OSiR_3^2$  group, where

$R^2$  are identical or different and are each hydrogen, halogen,  $C_1$ - $C_{20}$ -alkyl,  $C_1$ - $C_{20}$ -haloalkyl,  $C_1$ - $C_{10}$ -alkoxy,  $C_6$ - $C_{20}$ -aryl,  $C_6$ - $C_{20}$ -haloaryl,  $C_6$ - $C_{20}$ -aryloxy,  $C_7$ - $C_{40}$ -arylalkyl,  $C_7$ - $C_{40}$ -haloarylalkyl,  $C_7$ - $C_{40}$ -alkylaryl or  $C_7$ - $C_{40}$ -haloalkylaryl,

y is 1 or 2 and

x is 3 minus y.

2. A process as claimed in claim 1, wherein A in formula (I) is boron.
3. A process as claimed in claim 2, wherein  $R^1$  in formula (I) is  $C_6$ - $C_{10}$ -haloaryl,  $C_7$ - $C_{20}$ -alkylaryl or  $C_7$ - $C_{20}$ -haloalkylaryl.

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4. A supported cocatalyst obtainable by a process as claimed in any of claims 1 to 3.
5. The use of a supported cocatalyst prepared as claimed in any of claims 1 to 3 for preparing a catalyst system for the polymerization of olefins.
6. A catalyst system for the polymerization of olefins, obtainable by bringing at least one supported cocatalyst as claimed in claim 4 into contact with
  - D) at least one organic transition metal compound.
7. A catalyst system for the polymerization of olefins as claimed in claim 6, wherein
  - E) at least one organometallic compoundis additionally added in its preparation.
8. A catalyst system for the polymerization of olefins as claimed in claim 7 which is prepared by firstly preparing a catalyst solid by bringing at least one supported cocatalyst as claimed in claim 4 into contact with at least one organic transition metal compound D), then bringing this catalyst solid into contact with at least one organometallic compound E) in a second step and then using this mixture without further work-up for the polymerization.
9. A process for the polymerization of olefins using a catalyst system as claimed in any of claims 6 to 8.